

LEVEL A085-653

TROPICAL CYCLONE WIND THREAT FOR THE
BAY OF BENGAL

Progress Report
June 79

Contract AID-SOD-PDC-C-6116

SAI-#1-942-02-219-06

Science Applications, Inc. 2999 Monterey-Salinas Highway Monterey, California 93940

9 Progress rept.

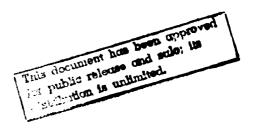
THIS DOCUMENT TO PERSONAL TOWN TO ACTICABLE.

THE CORY CONTROL OF ACAIMUD A
SIGNIAT OF THE CORY CONTROL OF



C FILE COPY

(12) 41/



ATLANTA • ANN ARBOR • BOSTON • CHICAGO • CLEVELAND • DENVER • HUNTSVILLE • LA JOLLA LITTLE ROCK • LOS ANGELES • SAN FRANCISCO • SANTA BARBARA • TUCSON • WASHINGTON

411325 Mu

# **DISCLAIMER NOTICE**

THIS DOCUMENT IS BEST QUALITY PRACTICABLE. THE COPY FURNISHED TO DTIC CONTAINED A SIGNIFICANT NUMBER OF PAGES WHICH DO NOT REPRODUCE LEGIBLY.

B-1

TROPICAL CYCLONE WIND THREAT FOR THE BAY OF BENGAL

Progress Report

June 1979

#### 

The ultimate objective of this effort is to provide the OFDA with reliable estimates of damage and casualties that will result from a particular tropical cyclone in the Bay of Bengal.

The contract objective is to design, develop, program and test a system suitable for automation to provide wind threat information from tropical cyclones in the Bay of Bengal.

Task 1. Analyze forecast errors to tailor an existing U.S. Navy model to the conditions encountered in the Bay of Bengal.

Task 2. Modify that model to apply it specifically to the geographical points on the periphery of the Bay of Bengal.

Task 3. Conduct a wind forecast error analysis which will form the basis of the estimate of the probability of cyclones exceeding 65 and 100 knots given that winds of a certain level were forecast.

Task 4. Devise a wind threat model which uses the modified Navy model and the probabilities of winds over 65 and 100 knots to determine the joint probability of both the cyclone striking a point and having winds in excess of 65 knots.

Task 5. Conduct real time (or near real time) tests of the model (Task 4) during the Fall 1978 and Spring 1979 Bay of Bengal cyclone seasons. Correct any detected deficiencies in any previous tasks.

Task 6. Report on test results with recommendations.

## B. Work Performed to Date:

Task	% of Total	% Completed	% of Total Completed
1	20	95	19
2	10	100	10
3	15	100	15
4	15	100	15
5	25	75	19
6	15	50	8
			85

C. Work has progressed on schedule. It was expected that more than 75% of the work would be done during the first three quarters.

## D. <u>Analysis of Progress:</u>

A suitable wind profile has been incorporated into the model. This model is after Riehl (1963). The input is maximum wind, which is then related linearly to radius of maximum wind. This relationship, is based on a study of western Pacific typhoons where (unlike the Bay of Bengal) wind radius information is available.

### Summary and Problem Areas:

The work is on schedule. Cyclone 17-79 offered an excellent opportunity for testing. A report of those tests is enclosed.

REPORT ON INDIAN CYCLONE 17-79 (May 1979)

June 1979

Jerry D. Jarrell

Science Applications, Inc. 2999 Monterey-Salinas Highway Monterey, California 93940

# TABLE OF CONTENTS

Introdu	ictic	n					•	•		•				•	•	•		•	•		•		1
Satelli	ite F	ìi	eti	ıre	e (	of	C	yc:	loı	ne	1	7–1	79								•		2
Cyclone	Des	CI	rip	ot:	ioi	a.			•			•		•			•	•		•	•	•	3
Area Th	reat													•		•	•				•	•	6
Point 7	Thres	it		•			•	•		•	•	•					•	•	•	•			8
Conclus	sion		•		•	•	•	•	•	•	•	•		•		•	•	•	•	•	•		11
Figure	1	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•	4
Figure	2				•		•	•	•		•	•		•								•	4
Figure	3						•													•			4
Figure	4		•		•	•														•			7
Figure	5																						9

#### REPORT ON INDIAN CYCLONE 17-79 (May 1979)

#### INTRODUCTION

During early May 1979, a cyclone (Number 17-79) formed in the Bay of Bengal and ultimately struck the coast of the Indian State Andhra Predesh. The damage was extensive but loss of life, while substantial, was surprisingly light. The latter point seems certain to be in part a reflection of preventive measures taken by the Indian government (GOI).

Science Applications, Inc. (SAI) in its Monterey, California office was tracking the cyclone and making wind threat calculations for demonstration and testing purposes. This was required by a contract with the Office of Foreign Disaster Assistance (OFDA), Agency of International Development (AID), U.S. Department of State.

The purpose of this report is to document the behavior of the wind threat model, relate any apparent weaknesses as well as remedial action taken, and to assess the value of this type information to officials facing crucial decisions relative to disaster prevention actions.

For background purposes, only the information available in the bulletins issued by the U.S. Fleet Weather Central/Joint Typhoon Warning Center Guam (JTWC) was used in real time. Forecasts from any agency could have been used so long as their statistical error distribution was understood.

The cyclone lasted from 6 May to 12 May, a total of 25 6-hourly bulletins were received. Wind threat estimates were derived from 23 of the 25 bulletins after the fact. During the cyclone, in near real time, wind threats were derived on 11 warnings. The wind threat estimate requires a total of about 5 minutes to make with a few seconds of this time actually devoted to the computer run. Since SAI is using the Navy's R&D computer at the Fleet Numerical Weather Central (Monterey, California) on a not-to-interfere basis, there were occasions when the computer was not available. For the most part the real-time estimates were discussed with OFDA. Typically this was once per day but became more frequent as landfall approached.

The reason for wind threat estimates is that fore-casts are imperfect, and that it is necessary to allow for error when using cyclone forecasts. The wind threat model considers all error possibilities and arrives at a sequence of probabilities that at least 65 kt winds will be observed within a geographic region and within an elapsed time.

Cyclone Description: Figure 1 shows a preliminary post-analysis track of Cyclone #17-79. This was provided through the courtesy of the JTWC. The cyclone formed in the vicinity of the southern Nicobar Islands in the eastern Bay of Bengal. Its ensuing track described a cycloid on 8 May, then a rather routine northwest track making landfall north of Nellore, Andhra Pradesh, on 12 May. Figure 1 gives estimated maximum winds (kts) daily at 0000 GMT along the track. Post analysis indicates winds of 120-130 kts may have been present at landfall.



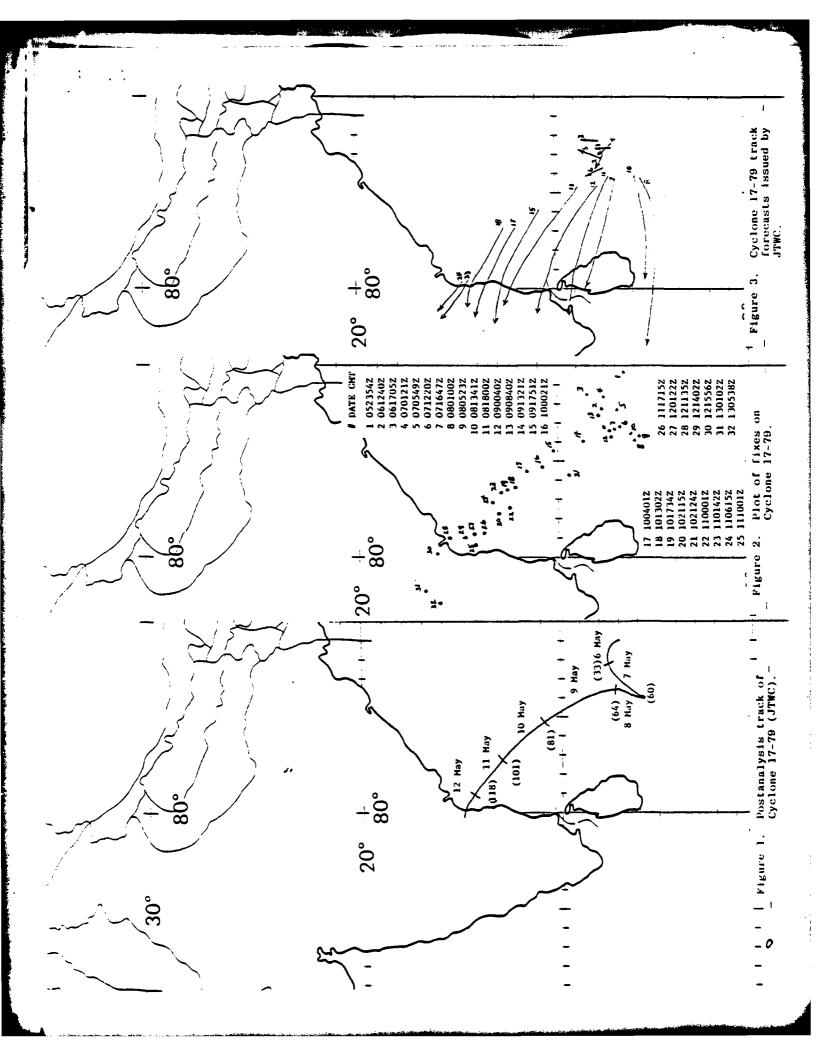


Figure 2 shows a plot of the "fixes" on Cyclone #17-79 received by the JTWC. All fixes were satellite based remotely interpreted either by U.S. Naval Personnel on Diego Garcia or the USAF Global Weather Central (GWC), Offut AFB at Omaha, Nebraska. The Diego Garcia readout is TIROS-N, it is our understanding that the readout equipment at Diego Garcia is not compatible with that satellite and consequently considerable picture distortion results. GWC on the other hand uses stored readout from the Defence Meteorological Satellite Program (DMSP). There are some time delays and occasional distortion problems associated with the cyclone center being far removed from the satellite swath center but this support is generally excellent. To our knowledge other satellite fixes (NESS stored readout, or Japanese GOES for example) nor coastal radar fixes were received by Guam in real time.

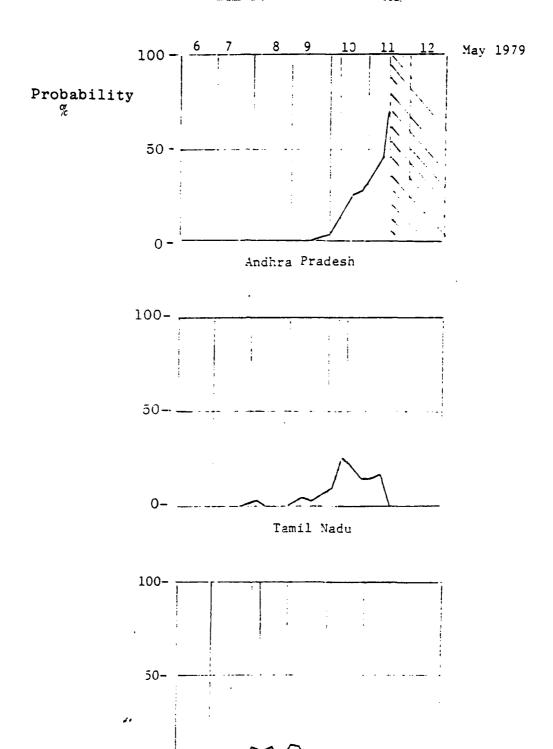
Figure 3 shows the track forecasts that were issued by the JTWC. To reduce an already cluttered diagram, only the first 12 hours of the early forecasts are shown, thereafter, until landfall, entire forecasts are shown although some of the late forecasts are omitted for readibility. The small numbers are sequential bulletin number, #1 is 1400 GMT on 6 May and they are at 6-hourly intervals, #24 is 0800 GMT on 12 May. The indecision reflected in the first ten forecasts can be related directly to the noise in the satellite fixes (see figure 2) which in turn illustrates the limitation of our current satellite cyclone fixing capability in the Bay of Bengal. This limitation was particularly evident when Cyclone #17-79 was weak since typically in weak cyclones there are no readily identifiable centers.

Overall the forecasts were average, but those which were issued after the center became better defined (and the positioning became regular and reliable) were in general excellent. After an initial forecast of recurvature toward Burma, the thinking then swung to the west southwest along the path of Cyclone #21-78 into Sri Lanka. Thereafter the forecast track inched northward across Sri Lanka and Tamil Nadu into Andhra Pradesh and actually came close to the path of the devastating cyclone of November 1977. The forecast at one time or another called for landfall on virtually every point on the 600 mile coast from Sri Lanka to 15°N latitude.

We will examine the wind threat estimates derived from the forecasts. Our point will be that even though the forecasts were constantly changing the wind threat for each point followed a conservative pattern of rising to a maximum and then falling as the threat passed.

#### AREA THREAT

Figure 4 shows these threats integrated over the coasts of Sri Lanka, Tamil Nadu and Andhra Pradesh. These plots are the threat of at least 65 kt (hurricane force) winds occuring within 36 hours after the issuance of each JTWC bulletin. Dates are shown across the top. Shaded bars indicate times when the most recent warning predicted landfall on that coast within 36 hours. The crosshatched area represents the approximate time when 65 kt (or greater) winds were probably occurring. This information can be inferred partly from the forecasts of figure 3. In addition to track forecast changes the threat increases or decreases with forecast speed of motion and forecast



0-

Figure 4. Area summed 36 hour 65 kt wind threat from Cyclone 17-79.

Sri Lanka

wind speeds. The sharp drop in threat to Sri Lanka on 8 May is due to a much slower motion forecast. Although the forecast at 2000 GMT 8 May was closer to the island than was the previous forecast, its arrival at that point was forecast 72 hours away compared to about 36 hours in the earlier bulletin, thus the uncertainty was greater (farther into the future) and the possibility of a correct forecast was less.

The impact of forecast maximum winds on the wind threat is manifest by the wind threat derived from Warning 13 (1400 GMT 9 May). The cyclones forecast intensity was significantly reduced compared to the forecasts immediately preceding and following. As a result, the threat to Sri Lanka dropped sharply as this was combined with a much more northward landfall forecast. That same dip is reflected for Tamil Nadu. In addition, we expected the track change to greatly increase the threat to Andhra Pradesh, but that was completely offset by the decreased wind forecast. We believe that the wind threat value is much more descriptive of the relative degree of threat than is the deterministic yes or no derived from the forecast.

#### POINT THREAT

Figure 5 illustrates the operation of an arbitrary set of rules keying an increasing degree of alertness simultaneously, to an increasing threat of hurricane force winds and decreasing lead time as follows.

	<sup>P</sup> 65	within the next
lst Alert (Green)	> 2.5%	48 hours
2nd Alert (Yellow)	> 5.0%	48 hours
3rd Alert (Orange)	>10.0%	48 hours
4th Alert (Red)	>20.0°c	24 hours

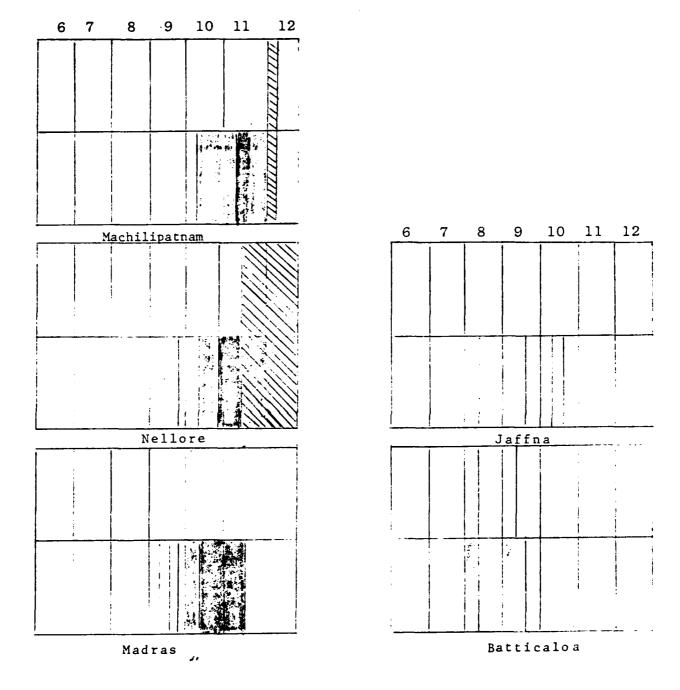


Figure 5. Color coded wind threat to selected cities from Cyclone 17-79.

Presumably first alert would be simply an admonition for the public to keep advised, officials would break out plans and go over them, but virtually no physical actions would be ordered.

The actions would increase until the fourth alert which would signal the point beyond which extensive preparations would be impossible, evacuation, if it were to be completed would in most cases have to be underway.

In figure 5 each small graph represents a coastal city. Times (dates GMT) are indicated across the top. The bottom half of the graph shows the color coded transition through the four alerts. The top half of the graph is shaded when the cyclone is forecast to pass within 100 nmi of the city within 36 hours. The cross hatched area represents the time when the cyclone was actually within 100 nmi of the city (based on figure 1).

We believe the evolution through the alerts to be orderly and timely. We would have hoped to see a few hours of red before the cyclone actually caused winds so strong as to stop preperations. This was not the case at Nellore. This is true because the forecast errors are so large in the Bay of Bengal. The probability around the forecast point is diluted so that the cyclone's future is known with reasonable confidence (error compared to the width of the destructive swath is small) only in very short range forecasts. Here we are assuming the winds extended 100 nmi from the cyclone center, or 20 hours (at 5 kts) before landfall. We expect a 20 hour forecast to have an error in excess of 100 nmi.

#### CONCLUSION

We believe the wind threat estimates were realistic and would have been useful in dealing with the disaster preparedness problem. In particular the area summed threat should be extremely valuable to alert disaster assistance forces as to the pending occurrence of a disaster within a broad region. The Point threats would be useful to guage the relative distribution of the threat in space, particularly with regard to population concentrations.

The Point threats could also be used directly by local government officials in considering what actions to order, and more specifically when to order such actions. It is noted that from this remote distance, the presence or absence of daylight, which is always an important consideration, is a constant source of confusion. Since this is a simple computation, it was added to the program output.

No other deficiencies were noted.

#### APPENDIX 1

This appendix contains copies of the computer output giving estimates of wind threats.

After-The Fact Runs: The output is described below:

Line 1: Printout of the input data - cyclone number, date-time group (Z=GMT), Latitude, Longitude, and maximum winds at forecast time, +24 hours and +48 hours. (48 at the end indicates 48 hours of forecast was given).

Lines 2 and 3: Self explanatory, events are strike or that winds of at least 40, 65 or 100 kts will be observed.

Line 4: Hours of darkness, (\*) indicates dark. Darkness is assumed between 1800 and 0600 local and a -6 time zone was used. This is provided because darkness is such an important consideration in disaster potential evaluation.

Strike Lines: These are probabilities that the cyclone center will cross the coast within these areas.

Wind Lines: These are the probabilities that cyclone location, intensity and size will combine to cause winds of at least 40, 65, 100 kts to be observed at some point on the coast of these areas.

Map: This is a map of the outline of the Bay of Bengal. Each asterisk represents a point for which the wind threat is computed. These asterisks will be replaced in order by the letters G, Y, O, R as 65 kt wind threat (P65) increases according to the following rules.

Symbol	P <sub>65</sub>	Time Limitation
*	< 2.5%	None
G	> 2.5%	Within 48 hours
Y	> 5.0%	Within 48 hours
0	>10.0%	Within 36 hours
R	>20.0%	Within 24 hours

# Real Time Runs:

Provided to OFDA separately are output from runs made in near real time. These are exact duplicates of the enclosed output copies except they do not contain the "hours of darkness" line, and they retain the GMT run time annotation affixed by the Fleet Numerical Weather Central's Computer Center.

```
17-79 11051-017 72N A775 30K 47M 858F 35K 101N 8455 45K 44
BOUNTAIFILIES OF EACHLE MILMIN JACE TSMS 5845 3845 7846 LOG CAUTONE 13-16 EDUM JETPIS.
                   HOURS OF DIRKHESS
  STRIKE WITHIN STI LANKA .0.301 .302 .374
41905 OF AT LEAST 43KNOTS 0.000 .000 .009
41935 OF AT LEAST 66KNOTS 0.000 .001 .303
41935 OF AT LEAST 190KNOTS 0.000 .000 0.000
                                                                          .349
                                                                          . 441
                                                                                   .041
                                                                          . 304
                                                                                    .613
                                                                           .033
                                                                                    . COC
   STRIKE WITHIN TAMIL NADU
                                             5.030 9.303
                                                                          . 315
                                                                                    . 365
    VINDS OF AT LEAST 40KNOTS 0.000 0.000 .000
                                                                          .034
                                                                                    .041
                                                                           .031
                                                                                    .008
    WINDS OF AT LEAST 100KNOTS 0.000 6.000
                                                                           .030
                                                                                    .000
                                                                 .000
   STRIKE WITHIN AN PRACESH
                                             0.900 0.000 0.003
                                                                          .001
                                                                                    .020
    HINDS OF AT LEAST 46KNOTS 0.000 0.000 0.000 WINDS OF AT LEAST 55KNOTS 0.000 0.000 0.000 9.000 9.000
                                                                          .000
                                                                                    .012
                                                                          . 007
                                                                                   .003
                                                                          .003
   STRIKE WITHIN EAST INDIA 0.000 0.000 HINDS OF AT LEAST 40KNOTS 0.000 0.000 41NOS OF AT LEAST 65KNOTS 0.000 0.000
                                                                                    .346
                                                                 • 263
                                                                           .017
                                                                          .304
                                                                .300
                                                                                    .047
                                                                • 333
                                                                          .001
     MINDS OF AT LEAST 100KMOTS 0.000 0.000
   STRIFE WITHIN AN ISLANDS 0.000 0.000 .001 41005 OF AT LEAST 40KMOTS 0.000 0.000 .000 41005 OF AT LEAST 46KMOTS 0.000 0.000 .000
                                                                           .332
                                                                                    .003
                                                                                   .001
                                                                          .001
                                                                          . 202
                                                                                   .300
     WINDS OF AT LEAST 100KNOTS 0.000 0.000 0.000
```

FOR CYCLONE 17-79 FROM 3623337 PROBABILITIES OF EVENTS HITHIN THES 124RS 244RS 364RS 484RS HUILS UE DIEKHESS 0.000 .001 .176 STRIKT WITHIN SRI LANKA .032 .104 WINDS OF AT LEAST WIRMOTS 3.000 WINDS OF AT LEAST ASKNOTS 0.000 . 711 .003 . 353 .396 .025 .314 .003 .021 WINDS OF AT LEAST 100KHOTS 0.000 0.000 0.000 STRIKE WITHIN TAMIL NADU 0.300 3.000 .001 .035 . 324 AINOS OF AT LEAST APKNOTS 3.330 0.003 .000 0.000 . 159 .312 .091 .012 SECOND DE AT LEAST 137KNOTS 0.600 0.006 0.000 .000 STRIKE WITHIN AN PRADESH 0.000 0.000 0.000 .035 .092 AINOS OF AT LEAST 43KNOTS 0.000 0.000 0.000 HINDS OF AT LEAST 45KNOTS 0.000 0.000 0.000 .001 .020 .397 .005 WINDS OF AT LEAST 103KNOTS 0.000 2.000 3.000 STRIKE WITHIN ORSA+W.SEN .001 2.000 2.000 0.000 0.000 HIGHS OF AT LEAST ANKHOTS 0.000 0.000 0.000 0.000 41405 OF AT LEAST 65KNOTS 0.000 0.000 0.000 0.000 .000 .000 MINDS OF AT LEAST 137KNOTS 0.000 0.000 0.000 0.000 STRIKE WITHIN FAST INDIA 0.000 0.000 . 325 .001 .133 WINGS OF AT LEAST "AGKNOTS 0.000 0.000 WINGS OF AT LEAST | 65KNOTS 0.000 0.000 .112 . 330 .271 . 0 3 9 . 392 .016 41405 OF AT LEAST 137KNOTS 3.730 3.000 3.300 0.000 0.000 STRIKE WITHIN AN ISLANDS .000 .002 .301 WINDS OF AT LEAST WORNOTS 0.000 0.000 WINDS OF AT LEAST ASKNOTS 0.000 0.000 .333 .301 .001 .000 .000 .000 WINDS OF AT LEAST 100KMOTS 0.000 0.000 .000 . 322 .000

17-79 110703007 79N ARGE 35K 96M ARZE 45K 112N 887E 55K 48 FOR CYCLONE 17-79 FROM 6763397 PROBABILITIES OF EVENTS WITHIN THPS 1245 2448 36495 48485 HOURS OF DARKNESS + STRIKE WITHIN SRI LANKA 0.000 0.000 .001 . 994 .021 WINDS OF AT LEAST ADKNOTS 0.000 0.000 .001 WINDS OF AT LEAST 65KNOTS 0.000 0.000 .000 .076 .017 . 371 .005 WINDS OF AT LEAST ISCHNOTS C. POC 0.800 .000 STRIKE WITHIN TAMIL NAMU 0.000 0.000 0.000 .001 .005 WINDS OF AT LEAST ADMINDTS 0.000 0.000 0.000 WINDS OF AT LEAST 65KNOTS 0.000 0.000 0.000 . 371 .005 .000 .032 HINDS OF AT LEAST 133KNOTS 0.000 0.000 0.000 . 222 STRIKE WITHIN AN PRADESH .004 0.000 0.000 0.000 . 933 WINDS OF AT LEAST ACKNOTS 0.000 0.000 0.000 WINDS OF AT LEAST 65KNOTS 0.000 0.000 0.000 .004 .336 .000 .301 WINDS OF AT LEAST 100KNOTS 0.500 0.000 0.000 .000 . 000 STRIKE WITHIN DRS4+W.REM 0.700 0.000 0.000 0.000 .001 WINDS OF AT LEAST AFKNOTS 3.536 3.003 8.306 6.803 WINDS OF AT LEAST 65KNOTS 3.300 8.603 6.000 6.668 .831 .000 WINDS OF AT LEAST 100KNOTS 0.000 0.000 0.000 G.000 STRIKE WITHIN EAST INDIA .010 .031 0.500 0.800 0.892 WINDS OF AT LEAST ASKNOTS 0.000 0.000 0.000 WINDS OF AT LEAST ASKNOTS 0.000 0.000 0.000 .001 .007 .003 - 000 WINDS OF AT LEAST 183KHOTS 6.008 9.000 0.009 STRIKE WITHIN BURMA STRIKE WITHIN BURMA 0.000 0.000 0.000 WINDS OF AT LEAST 40KMOTS 0.000 0.000 0.000 WINDS OF AT LEAST 65KNOTS 0.000 0.000 0.000 .000 .031 .005 .001 .000 .000 WINDS OF AT LEAST 18:KNOTS 0.500 0.000 0.000 .000 .000 STPIKE WITHIN AN ISLANDS 0.000 .001 .016 WINDS OF AT LEAST 40KNOTS 0.000 .000 .000 WINDS OF AT LEAST 65KNOTS 0.000 .000 .001 .046 .058 .031 . 349 .006 .012 WINDS OF AT LEAST 100KNOTS 0.000 0.000 0.000 .030 . 300

17-79 110708007 7211 8775 35K A7N 875F 45K 105N AP2E 55K 48 FOR CYCLONE 17-79 FROM 3708057 PROBABILITIES OF EVENTS WITHIN THPS 12MRS 24MRS 35MRS 48MRS HOLPS OF DARKNESS + \*\*\*\*\* + \*\*\*\*\* STRIKE WITHIN SPI LANKA G.000 0.000 WINDS OF AT LEAST ARKNOTS G.000 0.000 U.000 U.000 U.000 U.000 . 874 .021 .045 .003 .015 .035 .000 .003 .013 WINDS OF AT LEAST 107KNOTE 0.000 5.000 . 000 .000 . 200 STRIKE WITHIN TAMIL NADU 0.000 0.000 0.000 .091 . 00 A WINDS OF AT LEAST ASKNOTS 0.000 0.000 0.000 WINDS OF AT LEAST ASKNOTS 0.000 0.000 0.000 WINDS OF AT LEAST 100KMOTS 0.000 0.000 0.000 .001 .007 . 335 .032 .009 .000 STRIKE WITHIN AN PRAMESH 6.000 6.000 0.000 .004 . 900 WINDS OF AT LEAST 40KNOTS 0.000 0.000 0.000 WINDS OF AT LEAST 65KNOTS 0.000 0.000 0.000 0.000 .000 .034 .031 .000 .000 STRIKE WITHIN EAST INDIA 0.000 0.000 0.000 WINDS OF AT LEAST 45KNOTS 0.000 0.000 0.000 WINDS OF AT LEAST 65KNOTS 0.000 0.000 0.000 WINDS OF AT LEAST 100KNOTS 0.000 0.000 0.000 .001 .012 .031 .005 .000 .003 STRIKE WITHIN AN ISLANDS 0.000 .000 .323 .038 .006 WINDS OF AT LEAST ACKNOTS 0.200 HINDS OF AT LEAST ASKNOTS 0.200 HINDS OF AT LEAST 180KNOTS 0.200 .950 .503 .015 .227 -007 .050 .000

17-79 110714007 76N 871F 40K 99N 879E 50K 120N 890E 65K 48 FOR CYCLONE 17-79 FROM 0714007 PP09APILITIES OF EVENTS HITHIN OHRS 12HRS 24HRS 36HRS 48HRS HOURS OF DARKNESS +\*\*\*\* + STRIKE WITHIN SRI LANKA STRIKE WITHIN SRI LANKA D.GCC 0.000 .5CR winds of at least 43kg/ts c.dcc 0.000 .000 winds of at least 65kg/ts 0.000 0.000 .000 .079 .31 R .038 .017 .032 WINDS OF AT LEAST 191KHOTS 0.000 0.000 . 000 STRIKE WITHIN TAMIL NADU 0.136 0.000 0.000 .051 . 205 WINDS OF AT LEAST 40KNOTS 0.000 0.000 0.000 WINDS OF AT LEAST 65KNOTS 0.000 0.000 0.000 .001 .036 .000 WINDS OF AT LEAST 100KNOTS 0.000 0.000 0.000 STRIKE WITHIN AN PRADESH 0.000 0.000 0.000 .000 .006 WINDS OF AT LEAST 40KNOTS 0.000 0.000 0.000 WINDS OF AT LEAST 65KNOTS 0.000 0.000 0.000 .000 .007 .003 .003 WINDS OF AT LEAST 100KNOTS 0.000 5.000 6.000 .000 .002 STRIKE WITHIN ORSA+W. REN 0.000 0.000 0.000 0.000 WINDS OF AT LEAST 40KNOTS 3.000 0.000 0.300 0.000 WINDS OF AT LEAST 65KMOTS 3.230 0.000 9.300 0.000 .002 .001 WINDS OF AT LEAST 102KNOTS 0.000 0.000 0.000 5.000 -000 STRIKE WITHIN EAST INDIA 0.000 0.000 0.000 WINDS OF AT LEAST ADKNOTS 0.000 0.000 0.000 WINDS OF AT LEAST 65KHOTS 0.000 0.000 0.000 .001 .011 .003 .006 WINDS OF AT LEAST, 180KNOTS 0.000 0.000 0.000 .000 STRIKE WITHIN BUPMA 0.000 0.000 0.000 HINDS OF AT LEAST ASKNOTS 0.000 0.000 0.000 HINDS OF AT LEAST 65KMDTS 0.000 0.000 0.000 .002 .000 .000 .031 MINDS OF AT LEAST 102KNOTS 0.000 0.000 0.000 .000 STRIKE WITHIN AN ISLAMMS 0.000 WINDS OF AT LEAST 40KNOTS 0.000 WINDS OF AT LEAST 65KMOTS 0.000 .003 .000 .006 .001 .001 .030 .053 .004 .010 WINDS OF AT LEAST 101KNOTS 0.000 .000 .000 .000 .000

17-79 110720017 75N 366E 45K 35N 358E 60K 116N 867E 70K 48 FOR GYOLDNE 17-79 FROM 3720017 STRIKE WITHIN SRI LANKA . 3 2 4 . 373 3.330 .015 .135 MINGS OF 17 LEAST ARKNOTS 3.000 MINGS OF 17 LEAST SAKMOTS 3.000 . 372 .271 .115 .:27 .00 . 238 . 124 . 05 0 WINDS OF AT LEAST LANKHOTS G. 100 0.000 STOIKE WITHIN TAMEL MACH 5.008 8.000 .0+5 . 115 . 321 WINDS OF AT LEAST 40KNOTS 0.000 7.000 47105 OF AT LEAST 65KNOTS 0.000 7.000 . 351 . 215 . 361 . 337 .000 . 325 4INGS OF AT LEAST 183KNOTS 0.808 0.000 .324 HEFFAFR NE MITHEN AN PRAFISH . 332 0.000 0.000 WINDS OF AT LEAST 43KNOTS 0.300 0.000 0.000 WINDS OF AT LEAST 55KNOTS 3.300 0.000 0.000 . 334 .331 .014 WINDS OF AT LEAST 103KNOTS 0.300 3.003 0.303 .002 STRIKE WITHIN ORSA+W.REN 0.000 0.000 0.000 0.000 WING OF AT LEAST WORNITS 2.000 0.002 0.000 0.000 WINGS OF AT LEAST SERVOTE 0.000 0.000 0.000 0.000 .003 . 391 AINOS OF AT LEAST 103KMOTS 0.000 2.000 0.300 0.303 .017 STRIKE WITHIN EAST INDIA 3.000 0.000 .001 .371 AINNS OF AT LEAST 45KNOTS 3.635 3.005 WINDS OF AT LEAST 65KNOTS 3.636 3.003 .301 . 315 .355 .003 .038 .000 WINDS OF AT LEAST 100KNOTS 0.000 0.000 . 222 .000 .003 .000 .006 STRIKE WITHIN AN ISLANDS 0.830 0.308 .803 WING OF AT LEAST GUNNOTS 3.880 3.800 WINGS OF AT LEAST SERMOTS 0.800 3.800 .003 .006 .300 .000 .301 .003 WINDS OF AT LEAST 100KNOTS 0.000 0.000 .000 .000 .000

```
17-79 110302007 690 3605 50K 760 3325 60K 850 3005 55K 4A FOR CYCLOMS 17-79 5904 9307003
PROGRAPTETTES OF ENEMIS ALTHIN CHAS 15HOS STANS THAS THANS
   STRIKE HERHIM SRI LANKS 8.100
HIMOS OF AT LEAST ACKNOTS 8.300
HIMOS OF AT LEAST ARKNOTS 3.300
HIMOS OF AT LEAST 100KNOTS 3.300
                                                           .015
                                                                    1127
                                                                                        · 461
                                                          . 214
                                                                    . 159
                                                                              .351 .456
                                                          .233
                                                                    . }55
                                                                               .129 .174
                                                           •000
                                                                     . 329
                                                                               .012
   STRIKE WITHIN TAMIL NABU
                                                3.300 2.000
                                                                    . 334
                                                                               .074
                                                                                         . 204
                                                                    .314
    WINDS OF AT LEAST 40KNOTS 0.000 0.000 WINDS OF AT LEAST 65KNOTS 0.000 0.100
                                                                               .056
                                                                                        .134
                                                                                         .393
                                                                               .929
    WIMOS OF AT LEAST 10 KNOTS 0.000 1.000
                                                                               .001
                                                                                         .004
    STRIKE WITHIN AN PRANESH 0.000 0.000 0.000 WINDS DE AT LEAST 43KNOTS 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
   STRIKE WITHIN AN PRANESH
                                                                               .001
                                                                                         .018
                                                                               .904
                                                                                         .029
                                                                                       .037
                                                                               .001
                                                                               .969
   STPIKE WITHIN EAST INDIS 0.000 0.000 .004 WINDS OF AT LEAST 65KMOTS 0.000 0.000 .002 WINDS OF AT LEAST 100KMOTS 0.000 0.000 .000
                                                                               . 375
                                                                                         .221
                                                                               . 155
                                                                                        .138
                                                                              150
                                                                                        .338
                                                                               .001
                                                                                         .094
      c
```

```
17-79 1139-4017 - 954 4615 - 61K - 49M 434F - 66K - 49M 3025 - 70K 46 FOR CYCLONE 17-79 FROM 143217
STPIKE WITHIN SPI LAMKA 0.000 WINDS OF AT LEAST WORNOTS 0.000 WINDS OF AT LEAST 100KNOTS 0.000
                                                                                                    .230
    STRIKE WITHEN SPI LANKA
                                                                  .003
                                                                                        .199
                                                                  .023 .144
                                                                                        .122
                                                                                                    .235
                                                                  .001
                                                                             . 3 7 3
                                                                                         . 199
                                                                                                    .150
                                                                    .000
   STRIKE WITHIN TAMIL NAMU 0.639 0.000 0.000 WINDS OF AT LEAST 40KNOTS 0.000 0.000 0.000 WINDS OF AT LEAST 65KNOTS 0.000 0.000 0.000 WINDS OF AT LEAST 10KNOTS 0.000 0.000 0.000
                                                                                        .304 .840
.904 .33A
                                                                                         .012
                                                                                                    .323
    STRIKE WITHIN AN PRADESH
                                                      0.700 0.000 0.000 0.003
                                                                                                    .001
     WINGS OF AT LEAST WORNOTS 0.300 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
                                                                                                    .031
                                                                                                    .000
   STRIKE WITHIN EAST INDIA 0.000 0.000 0.000 WINDS OF AT LEAST 40 MOTS 0.000 0.000 0.000 WINDS OF AT LEAST 65 MOTS 0.000 0.000 0.000 WINDS OF AT LEAST 100 MOTS 0.000 0.000 0.000
                                                                                         . 134
                                                                                        .004
                                                                                                    .333
                                                                                          . 202
                                                                                                     .024
                                                                                          .000
                                                                                                     .032
```

17-79 110914007 ACN 3555 ACK 434 3345 ASK 539 7925 70K 4A FOR CYCLONE 17-79 FROM CR14007 HDISS OF DESAMBLE TARRES FARRE SEMBLE SEMBLE AND SEMBLE SEMBLE OF THE SEMBLE SE STRIKE WITHIN SRI LANKA 0.000 MINTS OF AT LEAST ADKNOTS 0.000 MINTS OF AT LEAST 100KNOTS 0.000 MINTS OF AT LEAST 100KNOTS 0.000 .133 .315 . 253 . 3. 2 . 25 \* .342 . 945 . 135 . 115 . 135 .000 .007 STRIKE WITHIN TAMIL NADU 0.000 0.000 WINDS OF AT LEAST 40KNOTS 0.000 0.000 0.000 WINDS OF AT LEAST 65KNOTS 0.000 0.000 WINDS OF AT LEAST 100KNOTS 0.000 0.000 .030 .038 .049 • 0 3 3 .834 1346 .029 .000 .004 .000 .003 STRIKE WITHIN AN PRACESH 0.200 0.000 0.000 0.000 HIVES OF AT LEAST WORKHOTS 0.000 0.000 0.000 0.000 HIVES OF AT LEAST 65KNOTS 0.000 1.000 0.000 0.000 0.000 .001 .012 . 333 WINDS OF AT LEAST 100KMOTS 0.000 0.000 0.001 0.003 STRIKE WITHIN EAST INDIA STRIKE WITHIN EAST INDIA | 0.000 0.000 | WINDS OF AT LEAST | 47KNOTS 0.000 0.000 | WINDS OF AT LEAST | 65KNOTS 0.000 0.000 0.000 . 200 .004 . 35 3 379 .000 . 346 .129 . 334 .000 WENDS OF AT LEAST 100KNOTS 0.000 0.000 . 333 .003

אניטט שב אני הלאטר אליטט אני האלאי אניטטן אני הלאטר איזיאנא פאן האאלי STRIKE ATTHIN SRI LANKA 0.000 MINOS OF AT LEAST 40KNOTS 0.000 MINOS OF AI LEAST 65KNOTS 0.600 . 324 .001 .373 .125 . 223 . 353 .125 .331 . 237 .371 .333 WITTE OF AT LEAST 100KHOTE 0.000 . 999 . 333 STRIKE NITHINITAMIL NADU 0.000 0.000 0.300 WINDS OF AT LEAST 46KNOTS 0.300 1.000 0.000 4100 0.000 65KNOTS 0.000 1.003 0.200 .391 .016 .391 .015 .361 .339 WINGS OF AT LEAST 100KNOTS 0.000 0.000 0.000 .400 -031 STRIKE WITHIN AN PRACESH 0.000 0.000 0.000 0.000 .000 WITHS OF AT LEAST ATMINTS 2.730 2.033 0.330 0.033 WITHS OF AT LEAST ASKNOTS 0.300 2.003 0.330 0.330 .001 .000 ATMOS OF AT LEAST 137KMOTS 0.000 3.000 0.000 0.000 .000 STRIKE WITHIN EAST INDIA 0.000 1.000 0.000 .016 .331 WINDS OF AT LEAST 43KHOTS 0.000 0.000 0.000 WINDS OF AT LEAST AFKNOTS 0.000 0.000 0.000 WINDS OF AT LEAST 100KNOTS 0.000 0.000 0.000 .301 .015 .309 .001 .000 .001 STRIKE WITHIN AN ISLINDS 0.300 0.000 0.000 WITHE OF AT LEAST WARMOTS 0.000 0.000 0.000 WINDS OF AT LEAST MAKENTS 0.000 0.000 0.000 . 330 . 903 .336 .300 WINGS OF AT LEAST 120KNOTS 0.000 0.000 0.000 .002 .000 G

```
17-79 113902007 730 3635 ASK
FOR CYCLONE 17-79 FROM 3902007
PROPARTITIES OF EMENTS WITHIN
                                                   124 4425 76K 964 815E 65K 48
                                                   CHES TSHES STHES APHES TRHES
                     HUILDS UE DIOKALES
   STRIKE WITHIN SRI LANKA 0.000
WINDS OF AT LEAST 40KMOTS 0.000
WINDS OF AT LEAST 55KMOTS 0.000
                                                           .035
                                                                      .524
                                                                                .231
                                                            .025
                                                                      .102
                                                                                . 255
                                                                                          . 372
                                                            .003
                                                                                          .137
                                                                      .061
                                                                                .142
     VINOS OF AT LEAST 103KNOTS 8.800
                                                            . 303
                                                0.000 0.000
   STRIKE WITHIN TAMEL NADU
                                                                      . 323
                                                                                          .755
     WINDS OF AT LEAST WAKHOTS 3.370 1.803 WINDS OF AT LEAST 65KHOTS 3.220 2.800
                                                                      .003
                                                                               . 350
                                                                                          .157
                                                                                .332
                                                                      .302
                                                                                          .392
     WINDS OF AT LEAST 101KMOTS 0.300 0.000
   STRIKE WITHIN AN PRATESH
                                                                               .002
                                                                                          . 124
                                                0.000 0.000 0.000
    WINGS OF AT LEAST "ASKNOTS 0.000 0.000 0.000 WINGS OF AT LEAST ASKNOTS 0.000 0.000 0.000 WINDS OF AT LEAST 100KNOTS 0.000 0.000 0.000
                                                                                          .338
                                                                               .005
                                                                                          .513
                                                                                .001
   STRIKE WITHIN EAST INNIA 0.000 0.000 WINDS OF AT LEAST 40KNOTS 0.000 0.000 0.000 WINDS OF AT LEAST 65KNOTS 0.000 0.000 WINDS OF AT LEAST 100KNOTS 0.000 0.000
                                                                     .303
                                                                                .357
                                                                                          .140
                                                                                          .173
                                                                               . 350
                                                                      .602
                                                                                .031
                                                                                          .131
                                                                      .330
                                                                                .002
                                                                                          .038
```

```
17-79 111903337 734 353F SSK DOM 3415 70K 103N 3155 SSK 48
FOR CYCEOMS 17-79 FROM COSSICS PROPARENTES OF EVENTS ALTHER
                                          THOS 12405 24405 THUS GAHOS
                 HOURS OF GLEKNIST
   WITH THE METHER SPI LINKA G.CO. WITH THE AT LEAST ASKNOTE C.CC. WITHOUT OF AT LEAST ASKNOTE C.CC. WINDS OF AT LEAST ASKNOTE C.CC.
  STOTKE WITHIN SOI LINKA
                                                                         .294
                                                . 309
                                                         .: 35
                                                         .135
                                                                         . 339
                                                .332
                                                                  . 240
                                                 . 115
                                                                  •123
                                                                          .174
                                                          . 771
                                                 .000
                                                                  .305
  STRIKE WETHIN TAMEL NAME 0.300 0.031 WINDS OF AT LEAST WINDERS 0.300 0.003 WINDS OF AT LEAST SEKNOTS 0.000 0.003
                                                                  . 379
                                                                          .216
                                                                  .983
                                                         . 335
                                                                          .218
                                                                 .048
                                                                          .117
                                                         - 214
   WINDS OF AT LEAST 100KHOTS 0.100 0.000
                                                                  . 33 ₹
                                                                          .009
  STRIKE WITHIN AN PRADESH
                                                                 . 106
                                                                          .051
                                        0.000 3.000 0.000
   HINDS OF AT LEAST 40KNOTS 0.000 0.000 0.000 4105 OF AT LEAST 65KNOTS 0.000 0.000 0.000
                                                                         .073
                                                                  .013
                                                                 .003
                                                                          . 127
   WINDS OF AT LEAST 137KHOTS 0.300 7.000 0.000
  STRIKE WITHIN DESA+W. ==4
                                        0.100 1.200 2.313 3.039
                                                                          .000
   MINDS OF AT LEAST ARKHOTS 2.030 3.200 2.210 0.220
MINDS OF AT LEAST ARKHOTS 2.200 2.200 0.220 0.000
                                                                          .731
                                                                          .000
    WINGS OF AT LEAST 100KNOTS 5.000 0.000 0.000 7.000
  .257
                                                         . 335
                                                                  . 345
                                                                         .236
                                                         . 105
                                                                 .J*1
                                                         . 304
                                                                  . 149
                                                                          .138
    MINDS OF AT LEAST 10 KNOTS 3.000 0.000
                                                                  .333
                                                         .000
                                                                          .011
          G
       Ģ
     G
```

.

17-79 113914337 ARN 4565 534 174M 4755 554 114M 3125 504 4A FOR CYCLOME 17-79 FOR 4 3014337 PROBACTLITIES OF EMERTS WITHIN THES 12HRS 24HRS 25HRS 464RS 464RS 46HRS 35HRS 35HRS 464RS STRIKE ATTHIN SPI LINKI 0.300 41NOS OF IT LEIST 43KNOTS 0.300 41NOS OF AT LEAST ARKNOTS 0.300 41NOS OF AT LEAST 137KNOTS 0.333 .003 . 173 .133 .191 .909 . }\*] .138 . 143 .072 . 121 . 339 . 35 0 .003 . 303 .001 STRIKE WITHIN TAMIL WADD 0.000 0.000 WINDS OF AT LEAST WINDERS 0.000 0.000 0.000 WINDS OF AT LEAST SEKNOTS 0.000 0.000 . 3 3 9 .145 . 254 .327 .131 .222 .339 .333 .067 WINDS OF AT LEAST 100KHOTS 0.000 0.000 . 339 .000 .001 HEPCERR VE NITHIN EXISTS .001 9.000 2.000 . 332 .116 WINTS OF AT LEAST WARNOTS 0.000 3.000 WINDS OF AT LEAST SARNOTS 0.000 0.000 . 304 . 145 .129 .000 . 203 .029 WINDS OF AT LEAST 131KNOTS 0.020 3.730 .393 .071 STRIKE WITHIN DRGA+4.3EN 0.030 0.003 J.333
WIMAS OF AT LEAST 43KNOTS 0.000 0.003 D.330
WIMOS OF AT LEAST 56KNOTS 0.030 3.000 0.303
WIMOS OF AT LEAST 100KNOTS 0.000 0.000 . 00 2 STRIKE WITHIN DREAM. PEN . 333 . 833 . 103 .001 .000 . 337 STOTKE WITHIN EAST INCIA 0.020 0.000 WINDS OF AT LEAST 40MOTS 0.000 0.000 WINDS OF AT LEAST SEKNOIS 0.000 0.000 .5 11 .178 .371 . 327 .142 .275 .808 . 345 .993 WINDS OF AT LEAST 103KNOTS 0.302 0.000 . 333 .301 .002

```
17-79 113920307 1044 3575 ACK 123M 3775 ACK 130M 3735 55K 48 FOR CYCLOME 17-79 FORM 0370007 PECSADULITYS OF EVENTS WITHIN OHES 12445 24465 75465 48465
                  HOUPS OF 01044585
   STOTER WITHIN SPI LINKE
                                                     . 372
                                                              .31+
                                                                      .331
                                          3.232
    41105 OF 41 LEAST WINNIES 2.000 HINGS OF 41 LEAST SERVICES 3.000
                                                             .323
                                                     . 203
                                                                               . 354
                                                                       .346
                                                                       .013
                                                     . 331
                                                                               . 719
    WINDS OF AT LEAST 100KHOFS 0.000
                                                                       . 1 77
   STRIKE WITHIN TAMIL MACH
                                          0.100
                                                     . 153
                                                              .0 21
                                                                               . 237
   WITHOU OF AT LEAST WORKHOTS 3.000
WITHOU OF AT LEAST SERVICTS 3.000
                                                             , ) 95
                                                                      . 235
                                                     .333
                                                                               . 253
                                                             . 372
                                                     .001
                                                                      .379
                                                                              . 196
    WINDS OF AT LEAST 137KNOTS 0.000
                                                     .000
                                                              . 333
                                                                      .001 ., .002
   STRIKE WITHIN AN PRACESH
                                                     .000
                                                              .050
                                           0.000
                                                                       . 125
                                                                               .223
    AINTS OF AT LEAST WINNIES 0.030 AINTS OF AT LEAST GARNOTS 0.030
                                                     .031
                                                             . 35 t
                                                                      . 154
                                                                               . 274
                                                     .000
                                                              . 311
                                                                      . 345
                                                                               .078
    WINDS OF AT LEAST TOOKNOTS 0.000
                                                    . 398
                                                              . 333
                                                                       .001
                                                                               .002
   STOLKE WITHIN DOSE-W. 154
                                           0.700 0.000 0.000
                                                                       .001
    41905 OF AT LEAST ACKNOTS 0.079 T.002 0.790 WINDS OF AT LEAST ASKNOTS 0.700 0.000 0.000 HINDS OF AT LEAST 100KNOTS 0.700 0.000 0.000
                                                                      .002 -
                                                                               .019
                                                                      .000
                                                                               .371
                                                                       .000
                                                                               .000
   STRIKE ATTHIN EAST INDIA
                                                              .113
    WINDS OF AT LEAST WORNOTS 0.000 WINDS OF AT LEAST 65KMOTS 0.000
                                                    .073
                                                            .132
                                                                               . 373
                                                                      .265
                                                     .031
                                                                      .108
                                                                               .153
                                                              .949
    MINDS OF AT LEAST 133KNOTS 6.538
                                                     .003
                                                              . 333
                                                                       .002
                                                                               . 694
           ۲,
           Ģ
```

17-79 111002337 139N 3435 65K 123N 3135 60K 130N 3035 60K 48 FOR CYCLONE 17-79 FROM 1032337 PROBABILITIES OF EVENTS WITHIN 3MPS 12MFS 24MPS 36MFS 48MPS HOURS OF GERKHESS STRIKE WITHIN SEL LANKA 0.000 WINDS DE AT LEAST WITHING 0.000 0.000 0.000 0.000 .003 . 924 . 135 .125 .307 . ] 45 .351 .001 .013 AINOS OF AT LEAST LOCKHOTS 8.000 .030 STRIKE MITHIN TAMEL NADU 0.000 MINOS OF AT LEAST 40KNOTS 0.000 4IMOS OF AT LEAST 55KMOTS 0.000 . 28 4 .015 .142 . 235 .173 . 337 .292 .115 .052 .101 .094 .124 WINDS OF AT LEAST 100KNOTS 0.000 .000 .002 .358 STRIKE WITHIN AN PRAJESH .153 9.300 . 221 MINGS OF AT LEAST ARKHOTS 0.337 MINGS OF AT LEAST GEKNOTS 1.003 MINGS OF AT LEAST 130KNOTS 0.300 . 199 .007 .270 .293 . 123 . 301 . 151 .084 .022 . 100 .301 MRE.W+ASSC MINTIN PAISTS 0.000 0.000 0.000 .001 .003 MIMOS OF AT LEAST WIKNOTS 0.000 0.000 0.000 WINDS OF AT LEAST 65KMOTS 0.000 0.000 0.000 .012 -306 .000 .001 WITTS OF AT LEAST 100KNOTS 0.200 0.000 0.000 STRIKE METHEN FAST INDIA .018 . 394 .200 .512 .137 . 355 .318 . 451 . 379 .000 .153 .201 WINDS OF AT LEAST 103KNOTS 8.308 .000 .021 .003 . . 336 G C +

17-79 111009077 1165 3705 753 1755 (145 354 1315 7945 558 43 STRIKE WITHIN SRI LIMMA 7.000 40005 OF AT LEAST ARKHOTS 0.000 4005 OF AT LEAST REKNOTS 0.000 .901 .338 .319 . 329 .343 . 152 .016 . 322 . 332 WINGS OF AT LEAST 10 KNOTS 0.000 . 25 2 THEKE WITHIN TAMEL MAIN D. 100 WINDS OF AT LEAST WORNING 0.000 WINDS OF AT LEAST WERKNOTO 0.000 .15? STRIKE WITHIN TAMEL NAOU . 2 31 .305 . 34? . 256 . 377 .455 . 232 .173 .260 . 30 9 WINDS OF AT LEAST 100KNOTS 0.000 . 115 . 6 75 11349 . 171 .307 0.000 . 149 .194 STRIKE WITHIN AN PRADESH . 25 8 AINOS OF AT LEAST ACKNOTS 0.000 AINOS OF AT LEAST BEKNOTS 0.000 .021 . 152 . 35 4 . 444 . 5 9 3 . 336 .173 .226 WINDS OF AT LEAST 100KNOTS 6.000 .032 . 111 .000 .348 .372 STRIKE WITHIN OPSAHW. REV .001 . 00 4 1.017 .331 . 302 . 990 . 334 . 251 STORE ATTHEW EAST ENDER 1.100 . 447 .566 AINDS OF AT LEAST - ARKHOTS 0.000 . 239 . 250 . 445 .553 . 277 . 195 . ??4 . 443 WINDS OF AT LEAST 100KHOTS, 0.000 .031 . 357 .098 1 G

17-79 111114717 1219 334F 75K 137M 312E 35K 143N 794E 50K 43 #CB CACTUME (1-14 EDUM (3111))

BOURTON CACTUME (1-14 EDUM (3111)) 40095 DE 0184 1755 +\*\*\*\* STRIKE WITHIN SRI LAWKA 0.100 4INOR OF AT LEAST WORKNOTS 0.300 WINOS OF AT LEAST MESKNOTS 0.300 .000 .002 . 111 . 136 . 115 .321 . 324 • 333 .012 .033 . 117 WINDS OF AT LEAST 100KHOTS 0.000 . 209 STRIKE WITHIN TAMIL MADU 2.500 . 145 .145 . 240 WINDS OF AT LEAST GENERAL BLOOD BLOOD . g a . .450 .250 . 240 . 349 .159 .051 .224 MINOS OF AT LEAST 101KNOTS 0.000 .156 STRIKE WITHIN TH BOTUERA .275 0.000 .027 . 337 WINDS OF AT LEAST WORNOTS 0.000 WINDS OF AT LEAST REKNOTS 0.000 .054 .369 .517 .023 .143 . 245 .297 WIMES OF AT LEAST 13 WHOTE 0.033 STRICE WITHIN DRSAHW. REM .300 0.300 3.003 .302 .005 MINOS OF AT LEAST ACKNOTS 0.000 0.000 HINOS OF AT LEAST REKNOTS 0.000 0.000 .020 . 115 .000 3.033 .032 .034 WIMAS OF AT LEAST 100KMOTS 0.100 STRIKE WITHTH EAST INDIA STRIKE WITHTN EAST INDIA 0.000 WINDS OF AT LEAST WORNOTS 0.000 WINDS OF AT LEAST SEKNOTS 0.000 . 173 .302 . 495 .591 .073 . 302 . 484 .599 . 354 .273 .430 .515 WINDS OF AT LEAST 10 KNOTS 8.120 . 3:2 . 129 . 396 G ) Э

17-79 111727027 1274 3345 75K 177H 8165 35K 145H 7245 50K 48 EGB CACTOME 14-54 ESCH 7151314 HOB CACTOME 14-54 ESCH 7151314 אריושה קד מזראיניה ++ . 303 STOIKE WITHIN GOT FINKT .337 .332 .337 .315 .103 .118 . 101 STRIKE WITHIN TAMIL NADU 2.000 WINDS OF AT LEAST 42KNOTS 0.000 WINDS OF AT LEAST 55KNOTS 0.000 .027 . 300 .143 .178 .213 .069 .304 . 364 .154 .144 .331 .102 MINOS OF AT LEAST 103KNOTS 0.330 .001 .314 %32A . 17A .075 STRIKE WITHIN AN PRADESH 3.000 . 335 .377 AINDS OF AT LEAST 43MNOTS 0.030 WINDS OF AT LEAST ARKNOTS 0.030 .055 . ? ₹2 .380 . 465 .157 .031 .274 MINDS OF AT LEAST 197KNOTS 9.530 .001 .345 .339 STRIKE WITHIN OPS4+W.REV . 600 .336 . 114 . 134 .038 WINGS OF AT LEAST 190KNOTS 3.000 0.300 .071 STRIKE WITHIN EAST INGLA WINDS OF AT LEAST AND . 269 . 443 2.078 .052 .563 MINDS OF AT LEAST FRENCES 0.000 WINDS OF AT LEAST WORNOTS 0.000 WINDS OF AT LEAST FRENCES 0.000 . 262 . 259 . 443 .551 . 249 .955 .301 MINOS OF AT LEAST 100KNOTS 3.222 . 325 . 155 . 394 .002 G 9 0 6.

```
17-79 111107007 1314 3265 307 1417 3095 35K 146M 7915 30K 48
HOUSE TE STORMERS A FOREST THE STORMERS THESE TOWNS THESE TOWNS THESE TH
                                                                                                                                                      STRIKE WITHIN SPI LANKA 3.000 0.000 HINDS DE AT LEAST ARKHOTS 0.000 0.000 0.000 HINDS DE AT LEAST 130KNOTS 0.000 0.000
                                                                                                                                                                                                 .323
       STRIKE WITHIN SPI LANKA
                                                                                                                                                                                                 . i ] 4
                                                                                                                                                                              . 233
                                                                                                                                                                              .323
                                                                                                                                                                                                   .034
                                                                                                                                                          . 223
                                                                                                                                                                                                    . 331
                                                                                                               .371
                                                                                                                                                                                                  .159
       STRIKE WITHIN TAMIL NADU
                                                                                                                                 .341
                                                                                                                                                         . 191
                                                                                                                                                                              .123
          WINDS OF AT LEAST WARMOTS WINDS OF AT LEAST SERVICES
                                                                                                                                                         . 273
                                                                                                              .534
                                                                                                                                .151
                                                                                                                                                                              .337
                                                                                                                                                                                                   . 346
                                                                                                              .001
                                                                                                                                 .052
                                                                                                                                                         .139
                                                                                                                                                                              .143
                                                                                                                                                                                                .177
          WINGS OF AT LEAST 138KNOTS
                                                                                                                                                         .309
                                                                                                               .000
                                                                                                                                    .002
                                                                                                                                                                               025 مر 117 .
                                                                                                                                                        . ? 4 7
       STRIKE WITHIN AN PRANESH
                                                                                                              .002
                                                                                                                                   .111
                                                                                                                                                                              . 399
                                                                                                                                                                                                    . 455
          ATHOS OF AT LEAST ACKNOTS WINDS OF AT LEAST SEKNOTS
                                                                                                                                                       . 350
                                                                                                                                                                              .514
                                                                                                                                                                                                   .539
                                                                                                              .002
                                                                                                                                 . 145
                                                                                                             . 132
                                                                                                                                .103
                                                                                                                                                                              .362
                                                                                                                                                        . 263
                                                                                                                                                                                                   .410
          WINDS OF AT LEAST 100KHOTS
                                                                                                                                 .005
                                                                                                                                                         .533
                                                                                                                                                                               . 356
          STRIKE WITHIN DRS4+4.254
                                                                                                                                                         .331
                                                                                                                                                                              . 334
                                                                                                                                                                                                   . 239
                                                                                                                                                        .310
                                                                                                                                                                              .333 . .146
                                                                                                                                                        . 131
                                                                                                                                                                              .394
                                                                                                                                                                                                   .337
        STOCKE ACTUMN EAST (MOCA)
                                                                                                              .012
                                                                                                                                                        . 373
                                                                                                                                   .152
                                                                                                                                                                              .532
                                                                                                                                                                                                    .623
                                                                                                            .112
                                                                                                                                                       . 3-4
          AINUS OF AT LEAST ANKHOTS
                                                                                                                                 .152
                                                                                                                                                                              .531
                                                                                                                                                                                                    .521
                                                                                                                                 .141
                                                                                                                                                        . 745
                                                                                                                                                                              .473
                                                                                                                                                                                                    .552
                                                                                                                                                        . 379
           MINOS OF AT LEAST 101KHOTS
                                                                                                            .000
                                                                                                                                  .003
                                                         G
                                n
                            'n
                            0
```

17-79 111173307 1304 3235 PIK 1425 NOSE 105K 1475 7395 30K 43 FOR CYCLONE 17-79 FROM 1173007 PROBABILITIES OF EVENTS WITHIN CHES 12HRS 24HRS 75HRS 484RS HUIS DE 0756/1563 + \*\*\*\*\* STRIKE WITHIN SRI LANKA 0.000 0.000 41005 OF AT LEAST WORKDAYS 0.000 0.000 0.000 0.000 0.000 .033 .033 .301 . 331 .003 .337 . 330 . 331 .004 WINDS OF AT LEAST 139KNOTS 3.937 3.888 .031 STRIKE WITHIN TAMIL NAGU .302 .051 . 293 .133 .155 WINDS OF AT LEAST AGENOTS WINDS OF AT LEAST 65KNOTS .059 . 353 .477 .204 . 431 .003 . 375 .192 211 . 141 MINDS OF AT LEAST 130KNOTS .067 .000 .016 . 944 .489 STRIKE WITHIN AN PRACESH . 335 .163 . 343 FINDS OF AT LEAST AIRMOTS AIRMOTS OF AT LEAST SEKNOTS . j 13 . 4 ? 7 . 214 .563 . 525 . 705 . 343 .152 . 445 .492 WITHTS OF AT LEAST 138KNOTS .001 . 353 . .037 STRIKE WITHIN OPS4+W. 3FM 8.236 3.839 .034 .001 MINGS OF AT LEAST ACKNOTS 2.332 2.332 MINOS OF AT LEAST ARKNOTS 2.332 2.001 .037 .041 .313 .316 . 151 . 394 WINDS OF AT LEAST 130KNOTS 0.000 0.000 .577 STRIKE WITHIN EAST INDIA .008 .650 . 214 . 442 WINDS OF AT LEAST GORNOTS WINDS OF AT LEAST GORNOTS . 442 .638 .577 .038 .214 . 65 3 . 440 .573 .645 MINDS OF AT LEAST 100KNOTS .064 .031 .350 9 G+

```
17-79 111114777 1421 313F 45K 166N 792F 31K 3N F08 CMCLORF 17-79 F00M 1114737 PP033HTLTTTES OF FWENTS 4[THIN THES 12HOS 24HOS H018S OF TIPMMTSS 4**** 4****
                                                                                          3 E
                                                                                                      €4 24
   STRIKE WITHIN TAMIL NADO
                                                      .3-2
                                                                .337
                                                                           .353
    WINDS OF AT LEAST ACKNOTS .138 WINDS OF AT LEAST SEKNOTS .233 WINDS OF AT LEAST 103KNOTS .231
                                                                • • 11 • 452
                                                                 .311
                                                                           . 113
   STRIKE WITHIN AN PRADESH
                                                       .132
                                                                 .612
     WINDS OF AT LEAST 40KMOTS HINDS OF AT LEAST 65KNOTS
                                                                .519 .776
                                                     .194
                                                      .192
                                                                 .610
                                                                           . 755
     WINDS OF AT LEAST 100KHOTS
                                                     .253
     STRIKE WITHIN ORSA+W.REM 0.300 0.000 WIMDS OF AT LEAST WORKHOTS 3.000 0.000 WIMDS OF AT LEAST SEKNOTS 3.000 0.000 WIMDS OF AT LEAST 107KNOTS 3.000 3.000
   STRIKE WITHIN ORSAHW. REM
                                                                           .001
                                                                          .317
                                                       .144
    STRIKE WITHTH EAST INCLA
                                                                 .619
     WINDS OF AT LEAST AGENOTS WINDS OF AT LEAST SEKNOTS WINDS OF AT LEAST 100KNOTS
                                                     .134
                                                                .519
                                                                           .775
                                                      .134
                                                                 .617
                                                                           . 773
                                                                .125
                                                                           . 254
```

17~73 111202007 1440 4055 90K 1600 7455 30K 30 FCP 090LONE 17470 5900 1202007 7455 30K 30 D004445LITTES OF EVENTS WITHIN 0405 12495 24495 460495 05 0404555 4 6\*\*\*\* 4 ЭΞ CK 24 HIMS OF AT LEAST 190KNOTS .001
HIMS OF AT LEAST ASKNOTS .001
HIMS OF AT LEAST 190KNOTS .000 STRIKE WITHIN TAMEL NACT .775 , 373 • 333 .011 .007 .001 . 171 STRIKE WITHIN AN PRADESH , 257 . 545 .588 ATMOS OF AT LEAST ANKHOTS WINDS OF AT LEAST SEKNOTS WINDS OF AT LEAST 100KHOTS . 254 .547 . 696 .252 .541 .540 .091 .129 STRIKE WITHIM ORSA+W.REN 0.000 0.000 41NDS OF AT LEAST 40KNOTS 0.000 0.000 3.000 WINDS OF AT LEAST 100KNOTS 0.000 0.000 WINDS OF AT LEAST 100KNOTS 0.000 0.000 STRIKE WITHIM DRS4+W.REW . 215 .001 STPIKE ATTHIN EAST INCLA .274 WINDS OF AT LEAST WINDS OF AT LEAST GARMOTS . 254 .543 .545 , 436 .253 .537 WINDS OF AT LEAST 100KNOTS . 192 . 1 79